

CLEAN VERSION OF THE SPECIFICATION

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a continuation-in-part patent application which relates to, and claims priority from the date of co-pending U.S. Patent Application Serial Number 10/654,627 entitled “Apparatus and Method for a Speaker Mounting System,” filed on September 2, 2003, and incorporated herein by reference.

TECHNICAL FIELD

[0002] The present invention is related to a speaker mounting system. More particularly, the present invention is related to a speaker mounting system comprising a surface mounting bracket with at least one male attachment mount and a speaker unit defining a plurality of angularly spaced apart female attachment grooves. Even more specifically, the present invention relates to a system and method having at least one male attachment mount being removably engaged with one of the plurality of angularly spaced apart female attachment grooves for facilitating speaker pointing angle adjustment.

BACKGROUND ART

[0003] Speaker mounting systems must provide flexibility to a user to strategically position one or more speakers to maximize acoustical listening quality within a given size, shape, or content filled room while maintaining the room’s aesthetic quality. This speaker mounting flexibility has become more important with the increased popularity of home theater systems that include speakers of varying types, sizes, and power rating. This flexibility of speaker positioning within a given room is necessary because speakers need to be aligned and pointed within a given size, shape, or content-filled room to maximize high fidelity home theater sound performance.

[0004] Current speaker mounting systems do not provide the needed mounting flexibility. For example, one typical speaker mounting system is a speaker stand, which supports a speaker above a horizontal surface such as a floor. The speaker stand does provide vertical adjustment and provides limited options to locate a speaker. Another type of speaker mounting system is a fixed mounting bracket that will rigidly attach a speaker to a horizontal or a vertical surface. Some fixed mounting brackets are problematic, because they do not provide a fixed speaker pointing angle adjustment. Other mounting brackets may include a base and adjustment arm and may optionally include a pivoting point physically attached between the base and an adjustment

arm to adjust the speaker angle. However, this pivoting mounting bracket is problematic, because the pivot point plus adjustment arm may not provide an accurate user-defined adjustment angle for the speaker or a secure mount. Further, the pivoting point will wear over time and with use, thereby causing the speaker to fall out of adjustment. Thus, a need exists for a speaker mounting system and method which will produce and maintain repeatable speaker pointing accuracy and precision over time and with multiple speaker positioning. Consequently, a need exists for a speaker mounting system and method that can provide flexibility for a user to position one or more speakers of various types, sizes, and power outputs at several positions within a desired acoustical area. Further, a speaker mounting system and method is required to provide other additional advantages over presently available speaker mounting systems, such as providing a lightpipe for displaying the intensity of an audio signal or a continuously adjustable base with markings for pointing-angle adjustment of a speaker unit.

DISCLOSURE OF THE INVENTION

[0005] Accordingly, the present invention provides a speaker mounting system and method. The speaker mounting system comprises a surface mounting bracket including at least one male attachment mount and a speaker unit. The speaker unit comprises at least one audio speaker and a semi-circular shaped surface. The semi-circular shaped surface comprises a plurality of angularly spaced apart female attachment grooves. The plurality of angularly spaced apart female attachment grooves are adapted for removably engaging the at least one male attachment mount. As such, the present invention allows a user to attach and to detach an audio speaker from the surface mounting bracket. In addition, the present invention allows a user to position the speaker unit within a surface mounting bracket for adjusting the acoustic sound pattern in a given room.

[0006] In one embodiment, the at least one male attachment mount is a flanged structure. The modified T-mount mates with the plurality of angularly spaced apart female attachment grooves. In another embodiment, a plurality of angularly spaced apart female attachment grooves are T-grooves that are formed on the semi-circular shaped surface.

[0007] A further feature of this invention that the audio speaker unit includes one or more columns of spaced apart speakers selected from a group consisting of tweeter drivers and midrange drivers. In the alternative, the audio speaker unit includes one column of speakers forming a linear array of speakers selected from a group consisting of tweeter drivers and midrange drivers. In the alternative, an optional feature of this invention is that audio speaker

unit comprises multiple columns of spaced apart speakers or a linear array of spaced apart speakers.

[0008] An optional aspect of speaker mounting system is that the semi-circular shaped surface further comprises an angle marking system which is adapted to store a location for at least one audio speaker, wherein the audio speaker is a column of spaced apart speakers selected from a group consisting of tweeter drivers and midrange drivers.

[0009] In another embodiment, the speaker mounting system has a detachable base stand including a base male attachment mount and a speaker unit comprising an audio speaker and a semi-circular shaped surface, the semi-circular shaped surface comprising a plurality of mechanically attached, angularly spaced apart female attachment grooves. The plurality of angularly spaced apart female attachment grooves are adapted for removably engaging the base male attachment mount.

[0010] One benefit of this attachment and detachment method is that the speaker unit may be relocated to a position that is more acoustically desirable for a user's listening pleasure. Further, this present invention speaker mounting system allows a speaker unit to be slid in and out of the surface mounting bracket multiple times without the need for tools or complicated removal schemes while a friction fit between mating surfaces will secure the speaker unit to the surface mounting bracket. In contrast, prior art wall mounting brackets require a user to physically disconnect the speaker from a wall using tools, such as a screwdriver or a wrench. Further, changing mounting location of prior art wall mounting brackets requires a user to drill new holes which will damage the mounting surface.

[0011] Another benefit of the present invention is that it allows a user to accurately replace a speaker in the same speaker pointing angle position from which it was taken. This benefit is the result of a plurality of angularly spaced apart female attachment grooves that are fixed in position which allow repeatable speaker unit adjustment in discretely spaced angular degree increments even after many attachments and detachments of a speaker unit. In contrast, prior art wall brackets that pivot may not accurately, or with repeatable results, provide alignment of a speaker unit, because the pivot, which may be a wall bearing or riveted joint, will over time wear, thereby producing inaccurate speaker pointing angle adjustment. Further, proper speaker pointing angle adjustment is critical for a home theater entertainment center, because a user wants the best sound quality for a given acoustical area.

[0012] In another feature of the present invention, a lightpipe is disposed within a speaker unit to display the intensity of an audio signal. In one preferred embodiment of the present invention, the lightpipe is a tube comprising an acrylic material.

[0013] In another feature of the present invention, a speaker unit includes planar speakers. In one preferred embodiment of the present invention, planar speakers comprise ribbon speakers. In another preferred embodiment of the present invention, planar speakers comprise ribbon speakers, quasi ribbon speakers, electrostatic loudspeakers (ESL), distributed mode loudspeakers (DML), and the like.

[0014] In a third embodiment of the present invention, the system comprises a rotating base stand feature. In the third embodiment, the rotating base stand comprises a ball bearing, a ring, and a shaft. The shaft mates with the ring to provide a solid connection. The ring mates with an inner ring disposed on a ball bearing. A speaker unit cooperates with the shaft to provide a mechanical connection, together forming a shaft speaker unit. A user can rotate shaft speaker unit in order to rotate the direction of the emitted audio sound. In this embodiment, the shaft speaker unit has a center of gravity near the rotating base stand to resist rotation. Further, in an alternative embodiment, angular markings may be located along the rotating base stand so that a user may remove a shaft speaker unit from a base stand and later replace the speaker, if desired, on a similar angular marking.

[0015] In a fourth embodiment of the present invention, a female mating surface mounting bracket includes a plurality of angularly spaced apart female attachment grooves. Also, a male mating speaker unit comprising an audio speaker and a male mating shaped surface defining a male attachment mount.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] For a better understanding of the present invention, reference is made to the below-referenced accompanying drawings. Reference numbers refer to the same or equivalent parts of the present invention throughout the several figures of the drawings.

[0017] Fig. 1 is a perspective view of the speaker mounting system according to a first embodiment of the present invention.

[0018] Fig. 2A is a perspective view of the speaker mounting system, showing at least one male attachment mount of a surface mounting bracket according to the first embodiment of the present invention.

[0019] Fig. 2B is a side view of a surface mounting bracket showing connecting angle θ of a bracket arm to a bracket connecting surface according to first embodiment of the present invention.

[0020] Fig. 2C is a side view of an alternative of the first embodiment of the present invention showing a semi-circular shaped surface mounting bracket.

[0021] Fig. 3A is a front view of a speaker unit, including multiple spaced apart speakers, i.e., a first column of audio speakers, according to the first embodiment of the present invention.

[0022] Fig. 3B is an off-angle side view of the speaker unit, including multiple spaced apart speakers, i.e., a second column of audio speakers according to the first embodiment of the present invention.

[0023] Fig. 3C is a side view of the speaker unit, having a plurality of angularly spaced apart female attachment grooves, according to the first embodiment of the present invention.

[0024] Fig. 4 is a perspective view of the speaker mounting system, showing the mechanical cooperation of a male attachment mount of surface mounting bracket and a plurality of angularly spaced apart female attachment grooves of speaker unit according to the first embodiment of the present invention.

[0025] Fig. 5 is a perspective view of a speaker unit attached to a detachable base unit according to the second embodiment of the present invention.

[0026] Fig. 6A is a perspective view of a detachable base male attachment mount according to the second embodiment of the present invention.

[0027] Fig. 6B is a side view of a speaker unit attached to a detachable base unit, according to the second embodiment of the present invention.

[0028] Fig. 7A is a perspective view of a lightpipe disposed within a speaker unit according to the present invention.

[0029] Fig. 7B is a diagram of a driver circuit for a light source that is a an LED for displaying of the intensity of the audio signal to a speaker unit according to the present invention.

[0030] Fig. 8 is a perspective view of a lightpipe as well as planar speakers disposed within a speaker unit according to the present invention.

[0031] Fig. 9 is a perspective view of a speaker unit in relation to a rotating base stand according to the third embodiment of the present invention.

[0032] Fig. 10 is a side view of a speaker mounting system, showing a male attachment mount of a speaker unit according to the fourth embodiment of the present invention.

MODES FOR CARRYING-OUT THE INVENTION

[0033] Referring particularly to Fig. 1, a perspective view of a speaker mounting system 10 according to a first embodiment of the present invention is shown. The speaker mounting system 10 is used to provide flexibility for a user to position one or more of various type, size, and power output speakers at various locations and at various angles within a desired acoustical area with repeatable speaker pointing accuracy and precision. Speaker mounting system 10 is an apparatus for mounting a speaker unit 12. Speaker mounting system 10 comprises a surface mounting bracket 14 and a speaker unit 12.

[0034] Referring particularly to Fig. 2A, a perspective view of a male attachment mount of a surface mounting bracket according to the first embodiment of the present invention is shown. Specifically, Fig. 2A depicts the surface mounting bracket 14. Surface mounting bracket 14 preferably comprises an extruded aluminum material. In the alternative, the surface mounting bracket 14 may be any hard, medium durability and strength material, for example, wood, fiberglass, steel, plastic, aluminum, alloy metal, composite metal, or the like. Surface mounting bracket 14 further comprises a bracket connecting surface 18 and at least one male attachment mount 20. Bracket connecting surface 18 has a first connecting structure 22. First connecting structure 22 comprises a hole pattern that accepts screws 28 that mechanically attach surface mount bracket 10 to a surface, for example a wall.

[0035] In this preferred embodiment, a male attachment mount 20 is a modified T-mount that is preferably made from an extruded aluminum material. In the alternative, a male attachment mount 20 may be composed of steel, wood, aluminum, fiberglass, metal alloy, aluminum alloy, or a like material. As shown in Fig. 2B and Fig. 2C, the male attachment mount 20 is mechanically connected at an angle θ to a bracket arm 30, which, in turn, mechanically connects to a bracket connecting surface 18 (Fig. 2C). Angle θ provides a speaker unit 12 with an adjustment mechanism that is built into the bracket mounting surface 18. The angle θ may be any angle approximately between 0 degree and 90 degrees relative to the bracket arm 30 with the preferred range approximately 35 degrees to approximately 55 degrees. As such, a user has one speaker mounting positioning and pointing flexibility option by using a bracket arm. The surface mounting bracket 14 (Fig. 2B) may have length in a range of approximately 2 inches to

approximately 30 inches, with the preferred range being approximately 5 inches to approximately 15 inches. The surface mounting bracket 14 may have width in a range of approximately 1 inch to approximately 6 inches, with the preferred range being approximately 1 inch to approximately 3 inches. In one alternative of the present embodiment, as shown in Fig. 2B, a surface mounting bracket 14 may be semi-circular shaped with one or more attaching features that may be connected at varying angles ϕ providing more angular flexibility to position a speaker unit 12 with at least one receiving feature. In another alternative of the present embodiment, a surface mounting bracket is two smaller brackets. Further, the size, the material, the insertion point, and the location of a surface mounting bracket, at least one male attachment mount, a first connecting surface, a bracket arm, and at least one male attachment mount set forth herein are only exemplary.

[0036] Fig. 3A is a front view of a speaker unit, including multiple spaced apart speakers, i.e., a first column of audio speakers, according to the first embodiment of the present invention. Specifically, Fig. 3A depicts a speaker unit 12 comprising a first column of audio speakers 40A covered by a first grill 45A (Fig. 3C) and a second column of audio speakers 40B covered by a second grill 45B (Fig. 3B). Fig. 3B is an off-angle lateral view of a second column of audio speakers 40B covered by a second grill 45B (Fig. 3C). The first column of audio speakers 40A are spaced apart speakers including woofer drivers 42A covered by first grill 45A. In an alternative embodiment, the woofer drivers may be replaced by midrange drivers. The second column of audio speaker 40B are spaced apart speakers including tweeter drivers 42B covered by a second grill 45B. The first column 40A and the second column 40B of audio speakers have a length within the range of approximately 1 foot to 9 feet with the preferred length range of approximately 1.5 feet to 3 feet. The first column 40A and the second column 40B of audio speakers have a width within the range of approximately 3 inches to 12 inches with the preferred width range of approximately 5 inches to 7 inches. In Fig. 3A, the woofer drivers 42A are pointed upward. The speaker unit 12 comprises a composite material or wood baffle enclosing the spaced apart speakers 42. In the alternative, the woofer drivers 42A may be individually tilted or repositioned within the column to produced a desired acoustical level within a room.

[0037] Fig. 3C is a side view of a speaker unit 12, having a plurality of angularly spaced apart female attachment grooves 44, according to the first embodiment of the present invention. In the alternative, the first column 40A and the second column 40B may be a spaced apart speakers to form a linear speaker array. The linear speaker array will allow a user to create both customized constructive and destructive audio interference patterns to tailor the acoustical pattern for a given room size or area fill. In another alternative, the audio speaker comprises multiple columns of spaced apart speakers that form the linear array to produce a desired directional acoustical pattern comprising both constructive and destructive sound interference patterns. The speaker unit 12 further comprises a semi-circular shaped surface 41 defining a plurality of angularly spaced apart female attachment grooves 44. The plurality of angularly spaced apart female attachment grooves 44 are adapted to mate with the male attachment mount 20 on the surface mounting bracket 14.

[0038] The plurality of angularly spaced apart female attachment grooves 44 are T-grooves having a separation angle β measured from the center point of the semi-circular shaped surface 41 (Fig. 3C). The plurality of angularly spaced apart female attachment grooves 44 allow a user flexibility in selecting the proper location for the positioning speaker unit 12. The plurality of angularly spaced apart female attachment grooves 44 are adapted for removably engaging the male attachment mount 20. The spacing of plurality of angularly spaced apart female attachment grooves 44 may be uniform, irregular, or any other chosen user-desired pattern disposed in between to produce a desired speaker pointing angle adjustment. In the alternative, the semi-circular spaced surface 41 may be any surface having a shape selected from a group consisting of flat, rectangular, oval, rounded, and partially hemispherical.

[0039] The plurality of angularly spaced apart female attachment grooves 44 may be marked so that a user can accurately record or replace a speaker unit 12 that has been previously removed. Also, the marking allows a user to correctly choose the desired pointing angle adjustment position. The plurality of angularly spaced apart female attachment grooves 44 preferably comprise an extruded aluminum material. In the alternative, the plurality of spaced apart female attachment grooves 44 comprises steel, wood, aluminum, fiberglass, metal alloy, aluminum alloy, and a like material. Further, an audio speaker comprises any medium durability and strength material such as fiberglass, wood, steel, aluminum, or metal alloy. Further, the size, the material, the insertion point, and the location of the spaced apart female attachment grooves 44 and the semi-circular shaped surface features set forth herein are only exemplary.

[0040] Fig. 4 is a perspective view of the speaker mounting system 10, according to the first embodiment of the present invention, showing the mechanical cooperation of the at least one male attachment mount 20 of the surface mount bracket 14 and a plurality of angularly spaced apart female attachment grooves 44 of the speaker unit 12. As shown in Fig. 4, to attach the speaker unit 12, the male attachment mount 20 is inserted into, and engages, one of a plurality of angularly spaced apart female attachment grooves 44 until the speaker unit 12 is securely positioned within one of plurality of angularly spaced apart female attachment grooves 44. A friction fit between the engaged angularly spaced apart female attachment grooves 44 and the male attachment mount 20 secures the speaker unit 12. To detach the speaker unit 12 from the surface mounting bracket 14, the speaker unit 12 is slid away from the surface mounting bracket 14 until the plurality of angularly spaced apart female attachment grooves 44 are not connected to the male attachment mount 20 and the speaker unit 12 is removed. In yet another preferred embodiment of the present invention, a locking screw (not shown) secures the engaged angularly spaced apart female groove 44 with the male attachment mount 20.

[0041] Fig. 5 is a perspective view of the speaker mounting system 10, according to a second embodiment of the present invention, showing a speaker unit 12 attached to a floor mount detachable base stand 59. In this embodiment, a speaker mounting system 10 comprises a floor mount detachable base stand 59 including a floor male attachment mount 65. The floor male detachable base stand 59 preferably comprises an extruded aluminum material. In the alternative, the floor mount detachable base stand 59 may be composed of a hard, durable material such as steel, a wood, an aluminum, a fiberglass, a metal alloy, an aluminum alloy, a plastic, or a like material. In this embodiment of the present invention, the speaker unit 12 preferably is a center channel speaker.

[0042] Fig. 6A is a perspective view of the detachable base stand 60 having a base male attachment mount 62 according to the third embodiment of the present invention. In Fig. 6, detachable base stand 60 includes a base male attachment mount 62 that mates with a plurality of angularly spaced apart female attachment grooves 44 on a semi-circular shaped surface 41 of a speaker unit 12. Base male attachment mount 62 are adapted for removably engaging a plurality of angularly spaced apart female attachment grooves 44 on a semi-circular shaped surface 41 of a speaker unit 12, whereby friction fit between the surfaces maintains the speaker pointing angle adjustment. The removable sliding feature allows a user an easy method without the need for tools to detach and to reattach a speaker unit 12 from the detachable base stand 60.

Fig. 6B shows a side view of base male attachment mount 62 on the detachable base stand 60. Further, base male attachment mount 62 may be marked so that a user may remove a speaker unit 12 from a base stand 60 and later replace the speaker unit 12, if desired, on the same marks. Finally, the type, location, or spacing of the base stand and the other features such as detachable base male attachment mount 62 and plurality of angularly spaced apart female attachment grooves 44 are only meant to be to exemplary.

[0043] Fig. 7A is a perspective view of a lightpipe 65 disposed within a speaker unit 12 according to the present invention. In this embodiment of the present invention, the lightpipe 65 is disposed within a speaker unit 12 to display the intensity of an audio signal. In one preferred embodiment of the present invention, the lightpipe 65 is a hollow tube comprising an acrylic material. In this preferred embodiment of the present invention, lightpipe 65 further comprises a first end 66 and a second end 68, wherein first end 66 and second end 68 are illuminated by a light source 70 such as a light emitting diode (LED).

[0044] Fig. 7B is a diagram showing a driver circuit for the light source 70 that is an LED for displaying of the intensity of the audio signal to a speaker unit. In particular, an audio signal is input to the speaker unit 12. The audio signal is electrically connected to differential input ports 72 of an amplifier 74. In the preferred embodiment, the amplifier is an operational amplifier, but in other preferred embodiments, may be any similarly functioning amplifying circuit or device. The amplifier 74 adjusts the level of the audio signal and converts the audio signal, which is a differential input signal, to a single-ended output signal 75. Afterwards, signal-ended output signal 75 is electrically connected to an active rectifying circuit 76 which is, in this preferred embodiment, another operational amplifier. The active rectifying circuit 76 adjusts the amplitude signal level and converts the single-ended output signal 75 to a rectified output signal 77.

[0045] A peak stretching circuit 78 is a user-selectable time-delay element comprising a capacitor 79 and a resistor 80 to ensure that the peak values are retained long enough to be seen. The peak values are adjusted to best create a visual representation of the aural experience. The current mode operation of the LED allows for the most useable range for the illumination and mating of the dynamic range of an LED to the wide dynamic range of audio signals. Finally, the peak stretching circuit 78 is electrically connected to output impedance buffering circuit 81, which is, in the preferred embodiment, an active current source follower to provide a low output impedance to light source 65 which light source is an LED. Afterwards, the LED illuminates first end 66 and optionally second end 68 of lightpipe 65 with an intensity proportional to the

level of the audio signal. In the preferred embodiment, the lightpipe 65 illuminates a wall (not shown in Figure) proximal to speaker unit 12, thereby providing a light intensity that is proportional to the intensity of the audio signal. In another embodiment, the LED provides background light on an adjacent surface for creating a visual theme or a visual mood. In other preferred embodiments of the present invention, a lightpipe comprises a material such as Lexan™, a plurality of optical fibers, a fluorescent light source, an incandescent light source, or a phosphorescent light source.

[0046] Fig. 8 shows a speaker unit 12 which includes planar speakers 71 as well as the lightpipe 65 according to the present invention. In one preferred embodiment of the present invention, the planar speakers 71 comprise ribbon speakers. In another preferred embodiment of the present invention, the planar speakers 71 comprise ribbon speakers, quasi ribbon speakers, electrostatic loudspeakers (ESL), distributed mode loudspeakers (DML), and the like. Planar speakers differ from conventional speakers in that planar speakers have a substantially flat, planar, or sheet-like transducer element, while conventional speakers have a conical transducer element. Because of the flat transducer element, planar speakers do not require the depth of a speaker having a conical transducer element, and thus are advantageous for use in applications with limited depth. In one preferred embodiment, planar speakers are included as dipoles with several feet therebetween, wherein the dipoles are positioned several feet away from a surface, such as an adjacent wall. In another embodiment, planar speakers that are electrostatic loudspeakers require a standard power supply.

[0047] Known planar speakers include the Magnaplanar® speaker manufactured by Magneplan in White Bear, MN, the planar focus technology (PFT™) speakers manufactured by Monsoon Audio™, ESL speakers manufactured by MartinLogan™ in Lawrence, Kansas, and the DML developed by NXT Technology™ in London, United Kingdom. Planar speakers may be used alone or in combination with conventional speakers. In one instance, a standard CD player is electrically connected to a preamplifier such as Lexicon MC12™ (not shown). The preamplifier (not shown) functions to adjust a level of the audio signal. Afterwards, the audio signal is electrically connected to an input port of a Monster Power amplifier such as MPA 3250 (not shown in Figure). Subsequently, an output port of an amplifier, such as the Monster Power™ amplifier, is connected to a planar speaker. In yet another instance, the audio signal processing functions are performed using one processing circuit residing within the speaker unit.

[0048] Fig. 9 is a perspective view of a speaker unit in relation to a rotating base stand 82 according to the third embodiment of the present invention. In particular, Fig. 9 displays the rotating base stand 82 which comprises a ball bearing 83, a ring 84, and a shaft 86. The shaft 86 mates with the ring 84 to provide a mechanical connection. The ring 84 mates with a ball bearing inner ring 85 which is disposed within the ball bearing 83. A shaft speaker unit 88 is mechanically connected with the shaft 86. The ring 84 is slid into the ball bearing inner ring 85. A user rotates the shaft speaker unit 88 to redirect the direction of the audio sound emitted by the shaft speaker unit 88. The forces produced by the weight of the shaft speaker unit 88 on the ball bearing 83 plus friction produced by the shaft speaker unit 88 on the ball bearing 83 will maintain the shaft speaker unit 88. Furthermore, the shaft speaker unit 88, having a center of gravity 90 located near the ball bearing 83, prevents the shaft speaker unit 88 from becoming unstable and falling. Further, in an alternative embodiment, the angular marking 92 may be located along the rotating base stand 82 so that a user may remove the shaft speaker unit 88 from a rotating base stand 82 and later replace the shaft speaker unit 88, if desired, on the same angular marking 92.

[0049] In addition to the present invention system, a method for positioning an audio speaker is disclosed. The method comprises the steps of: mounting a shaft speaker unit 88 being mechanically connected to a shaft 86 which is, in turn, connected to a ring 84; inserting the ring 84 into a ball bearing inner ring 85 disposed in a ball bearing 83; rotating shaft speaker unit 88 within the ball bearing inner ring 85; selecting an angular marking 92 disposed on the rotating base stand 82; and aligning angular marking 92 with a shaft speaker unit marking 91 disposed on the shaft speaker unit 88.

[0050] Fig. 10 is a side view of a speaker mounting system, showing a male attachment mount of a speaker unit according to the fourth embodiment of the present invention. The speaker mounting system 94 comprises a female mating surface mounting bracket 95 including a plurality of angularly spaced apart female attachment grooves 44; and a male mating speaker unit 97 comprising an audio speaker (not shown) and a male mating shaped surface 100 defining a male attachment mount 20. The male attachment mount 20 is adapted for removably engaging with plurality of angularly spaced apart female attachment grooves 44. Another feature of the present embodiment is that the male attachment mount 20 is a T-mount. Yet another feature of the present embodiment that speaker mounting system 94 further comprises a lightpipe 102 functions similar to the lightpipe 65. The lightpipe 102 is disposed in the male mating shaped surface 100, wherein the lightpipe 102 is a tube comprising an acrylic material which illuminates a surface (not shown) proximal to the male mating speaker unit 97.

[0051] Information, as herein shown and described in detail, is fully capable of attaining the above-described invention, the present preferred embodiment of the invention, and is, thus, representative of the subject matter which is broadly contemplated by the present invention. The scope of the present invention fully encompasses other embodiments which may become obvious to those skilled in the art, and is to be limited, accordingly, by nothing other than the appended claims, wherein reference to an element in the singular is not intended to mean one and only one unless explicitly so stated, but rather “one or more.” All structural and functional equivalents to the elements of the above-described preferred embodiment and additional embodiments that are known to those of ordinary skill in the art are hereby expressly incorporated by reference and are intended to be encompassed by the present claims.

[0052] Moreover, no requirement exists for a device or method to address each and every problem sought to be resolved by the present invention, for such to be encompassed by the present claims. Furthermore, no element, component, or method step in the present disclosure is intended to be dedicated to the public regardless of whether the element, component, material, or method step is explicitly recited in the claims. However, one skilled in the art should recognize that various changes and modifications in form and material details may be made without departing from the spirit and scope of the inventiveness as set forth in the appended claims. No claim herein is to be construed under the provisions of 35 U.S.C. section 112, sixth paragraph, unless the element is expressly recited using the phrase “means for.”

INDUSTRIAL APPLICABILITY

[0053] The present invention applies industrially to a speaker mounting system. More particularly, the present invention applies industrially to a speaker mounting system for speaker pointing angle adjustment and a light pipe for displaying the intensity of an audio signal for a home theater system.